

PROGRESS REPORT

The Relationships of Site and Stand Attributes  
and Management Practices to Douglas-Fir Tussock Moth Epidemics

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DFTM Activity to Which Work is Addressed

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## SUMMARY

Site and stand characteristics were described and defoliation intensities ocularly assessed on a total of 71 study units; soil data were taken from 45 study units. Detail information to estimate defoliation, foliar surface and biomass was obtained by destructive sampling of 52 grand fir and 53 Douglas-fir trees on 35 study units. All data taken (with exception of soil data) were processed for computer analysis.

The defoliation information gained from the destructively sampled trees was used to develop regression estimators for correcting ocular defoliation estimates for each host species. For grand fir, a linear model provided a good fit ( $R^2=.84$ ). The best fit obtainable for Douglas-fir, however, was poor ( $R^2=.45$ ) due to the small range in defoliation intensity for that species found in this study in conjunction with the limited resolution of the ocular estimation technique. Regression estimators for foliar surface area and biomass are presently being developed.

Analysis of data from stands containing both host species showed that grand fir subjected to substantially higher defoliation than Douglas-fir ( $\alpha=0.005$ ). The variation attributable to species differences accounted for 31 percent of the total tree to tree variation in percent defoliation.

Regression tests are being conducted to determine the functional relationships of defoliation levels to site/stand characteristics. The best one-variable models tested used (1) the interaction of percent grand fir and percent host species in the stand and (2) the natural logarithm of stand age ( $R^2=.293$  and  $.184$  respectively). These variables also provided the best two-term model, accounting for 41 percent of the

variation; all third terms added to date to this model have proved non-significant. The effect of slope position was tested using an orthogonal polynomial technique which showed that the rate of defoliation increased in a linear fashion as one moved from a lower through a middle to an upper slope position but that no significant difference existed between upper slope and ridgetop positions.

Conclusions to be derived from results obtained to date are discussed and the work remaining outlined.

Close cooperation was established between Robert Heller's aerial interpretation project conducted in the Blue Mountains. Preparations for continued cooperation and coordination between Heller's new project in northern Idaho, the present study and the "Comparison of physiological environment . ." study are in progress. A discussion on possible follow-up studies is presented.

Two publications are in preparation, four additional planned and two more are a distinct possibility.



## ACCOMPLISHMENTS

## INTRODUCTION

The following summary of the October 10, 1975 progress report is included to set the framework for the accomplishments made to date.

Summary of the Progress Report of October 1975

The study was confined to the Palouse Range of Northern Idaho. Field data were collected in accordance with the study plan. Seventy-one study units (each consisting of 3 plots) were described in terms of site and stand characteristics and ocular estimates of defoliation intensities were made. Estimation of defoliation by destructive sampling is still in progress. Time and manpower needs were underestimated; this due to difficulties encountered in locating stands in desired site and stand strata, and the time involved in estimating defoliation. Even though field data have not been completely analyzed, the observations suggest that the following variables have predictive capabilities: (1) host tree composition of stands (grand fir subject to higher defoliation levels than Douglas-fir); (2) stand age (young stands less affected than mature or old stands); (3) radiation index of the site (defoliation levels correlated with higher radiation indexes); (4) stand structure (multistoried stands subject to higher defoliation than one-storied stands). These observations seem to agree with preliminary conclusions of an exploratory study (Stoszek et al., 1975). Thus we feel that the objectives set forth in the study plan will be met.

Close cooperation and coordination of efforts was established with the study by Dr. Hatch. Opportunities to interface results of this study with studies on insect dynamics and studies within the stand





## Location of Complete Research:

Author & Title: k. J. Stoszek et al.:  
PROGRESS REPORT: THE RELATIONSHIPS OF SITE AND STAND  
ATTRIBUTES AND MANAGEMENT PRACTICES TO DOUGLAS-  
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